

A SYNOPSIS OF THE FROGS OF THE GENUS *HYLA* OF NORTH-WESTERN AUSTRALIA, WITH THE DESCRIPTION OF A NEW SPECIES

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INTRODUCTION

In comparison with studies undertaken in other parts of Australia, the hylid frog fauna of the north-west has received little attention. The most recent checklists of the species of *Hyla* are those compiled by Moore (1961), recognizing six species in northern Western Australia and nine in the Northern Territory. The majority of the species listed are widely distributed in Australia, but the recorded presence of *Hyla aurea* and *H. adalaidensis* in the Northern Territory evoked comment from Moore because the disjunct distribution conflicted with existing knowledge.

In a recent study Tyler (1968a) investigated the taxonomic status of the members of the *H. lesueuri* complex occurring in north-western Australia and described a new species apparently confined to the area. The possible existence of an endemic element within the hylid frog fauna has been reinforced by the subsequent collection of a further undescribed species.

This study has endeavoured to establish the number of species of *Hyla* occurring in the north-west and to compare their distribution patterns.

MATERIALS AND METHODS

The specimens reported are lodged in museum collections which are abbreviated in the text as follows:—British Museum (Natural History): B.M.; Museum of Comparative Zoology: M.C.Z.; National Museum of Victoria: N.M.V.; South Australian Museum: S.A.M.; United States National Museum: U.S.N.M.; Western Australian Museum: W.A.M. Letters preceding registration numbers are departmental catalogue references.

Methods of measurement and descriptive techniques conform to those used by Tyler (1968b). The following abbreviations appear in the text:—E-N/IN (ratio of the eye to naris distance to the internarial span); HL/HW (head length to head width ratio); HL/S-V (head length to snout to vent length ratio); TL/S-V (tibia length to snout to vent length ratio).

***Hyla meiriana* new species**

Hyla adelaidensis, Mitchell (1955) p. 405, (1964) p. 339.

HOLOTYPE: S.A.M. R. 9082. An adult female collected at a rock pool 98 miles north of Mainoru, Northern Territory, by A. Fleming, R. Edwards and H. Bowshall on August 19, 1967.

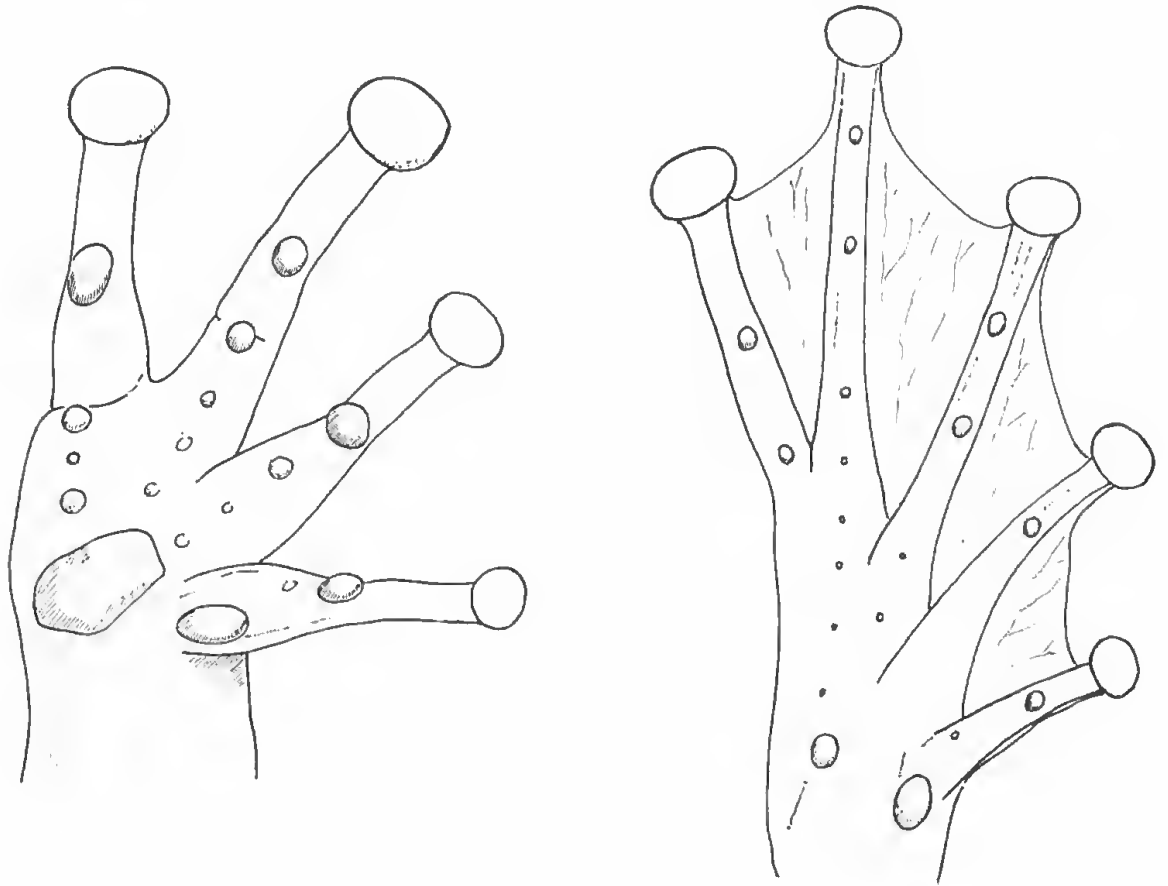


FIG. 1.

Hand and foot of *Hyla meiriana* sp. nov.

DEFINITION: An extremely small species with a maximum snout to vent length of 22.5 mm, characterised by an extremely high E-N/IN ratio (1.286-1.600), short and unwebbed fingers with prominent, transversely oval discs, and extensively webbed toes (the webbing reaching the base of the discs of all toes except the fourth).

DESCRIPTION OF HOLOTYPE: The head is longer than broad (HL/HW 1.097); its length equivalent to considerably more than one-third of the snout to vent length (HL/S-V 0.383). The snout is not prominent; it is rounded when viewed from above and rounded and projecting slightly in profile. The nares are high and oblique, their distance from the end of

the snout less than that from the eye. The distance between the eye and the naris is considerably greater than the internarial span (E-N/IN 1.600). The canthus rostralis is poorly defined and slightly curved. The loreal region is concave. The eye is not prominent, its diameter slightly greater than the eye to naris distance. The tympanum is prominent, its diameter equivalent to two-thirds of the eye diameter and separated from the eye by a distance equivalent to approximately one-third of its own diameter. The vomerine teeth are in two raised and slightly oblique series. A line on a level with the posterior margins of the choanae would bisect them. The tongue is roughly circular and lacks a posterior indentation.

The fingers are rather short and are equipped with extremely narrow lateral fringes; in decreasing order of length $3 > 4 > 2 > 1$. There is no inter-digital webbing. The terminal discs are prominent and transversely oval in shape (Fig. 1).

The hindlimbs are long and slender with a TL/S-V ratio of 0.539. Toes in decreasing order of length $4 > 5 > 3 > 2 > 1$. The interdigital webbing reaches the base of the terminal discs of all toes except the fourth where it extends as far as the subarticular tubercle at the base of the penultimate phalanx, and is united to the disc by a narrow lateral fringe (Fig. 1).

There are numerous broad, flattened, very poorly developed tubercles over the entire dorsal surface of the head and body. Each tubercle is composed of numerous small granules, particularly conspicuous in the sacral region. There is a very weak supratympanic fold obscuring the superior margin of the tympanic annulus. There is a prominent oval inner and a small but prominent rounded outer metatarsal tubercle. The throat, chest and lower surfaces of the limbs are smooth and the abdomen is granular.

DIMENSIONS: Snout to vent length 20.6 mm; tibia length 11.1 mm; head length 7.9 mm; head width 7.2 mm; eye to naris distance 2.4 mm; internarial span 1.5 mm; eye diameter 2.5 mm; tympanum diameter 1.6 mm.

In preservative the dorsal surface is dark brown with indistinct black markings surrounding the individual tubercles. When the skin is moist the granular areas within the tubercles possess a distinct metallic iridescence. The canthus rostralis bears a short blackish stripe, and heavy stippling on the mandibular margins produces a pattern of light and dark patches. The anterior and posterior surfaces of the thighs and the posterior surface of the tibia are strikingly variegated with black on a cream background. The throat and chest are uniformly stippled with black on a pale cream background and there is irregular stippling on the ventral surface of the thighs.

VARIATION: There are 32 paratypes collected at the type locality with the holotype:—S.A.M. R. 9014-34, 9074-81, 9083-85.



FIG. 2.
H. meiriana sp. nov.

Adult male paratypes have snout to vent lengths ranging from 16.2 mm to 18.2 mm, whilst the range for females is 17.6-20.7 mm. None of the females are gravid. In their proportions they exhibit only slight variation. The E-N/IN ratio is consistently high with a range of 1.286-1.563 and the mean 1.407. The head is longer than broad in all specimens with an HL/HW range of 1.057-1.222 and the mean 1.132. The TL/S-V range is 0.541-0.640 and the mean 0.584.

The colouration and pattern of markings of the paratypes closely resembles those of the holotype. Divergences worthy of note are the presence of a dark transocular bar in some specimens, and the fact that variegations on the lateral surfaces of the thighs frequently extend on to the dorsal surface.

An additional 34 specimens also represent this species: S.A.M. R. 3235, 9734; U.S.N.M. 12870-25, Oenpelli Creek, 5 miles S.S.E. of Oenpelli, N.T. S.A.M. R. 9097-9100, Kununurra, W.A. N.M.V. D. 10773-74, 10811-16, 10818-26, Jaspers Gorge, N.T. W.A.M. R. 13758, 13758 G-J, Kalumburu, W.A.

The four specimens from Kununurra have E-N/IN and HL/HW ranges within those of the paratypes, but the hind legs are shorter (the TL/S-V range being 0.476-0.556 with a mean of 0.515). One of these specimens (S.A.M. R. 9100) is the largest representative of the species being a gravid female with a snout to vent length of 22.5 mm. Another member of this series is depicted in Fig. 2.

The specimens from Jaspers Gorge differ from the type series in having more extensive webbing of the feet (reaching mid-way up the penultimate phalanx of the fourth toe), and in their colouration. The dorsum in this series is a much darker brown, with the dorsal surface of the thigh similar to the colour of the head and back (the light markings on the posterior face do not extend upon it). The ventral surfaces are much more heavily and extensively marked; the throat is usually a uniform dark brown and only infrequently stippled with brown, and the ventral surface of the thighs is suffused with brown in most specimens.

COMPARISON WITH OTHER SPECIES

Of the Australian species with completely unwebbed fingers the only one whose adults are within the size range of *H. meiriana* is *H. microbelos* of Queensland. A single specimen has been available for comparison (M.C.Z. 70013), an adult male collected at Cooktown which is approximately 100 miles north of the type locality (Cairns).

Hyla meiriana may be distinguished by the presence of vomerine teeth and outer metatarsal tubercles (absent in *H. microbelos*) and by its more extensively webbed toes. In preservative *H. meiriana* has a dark brown dorsal ground colouration and striking post-femoral markings, whereas *H. microbelos* is a very pale grey and lacks these markings.

Of the Papuan species *H. dorsalis* attains a similar adult size but may also be distinguished by having less extensive webbing between the toes, as revealed by comparison of Fig. 1 with the illustration of *H. dorsalis* provided by Tyler (1968b, Fig. 25). The shape of the snout differs in being evenly rounded and not particularly prominent, whereas in *H. dorsalis* it is pointed and projecting. None of the 62 specimens of *H. meiriana* examined bear the median, longitudinal, pale brown band visible on the dorsum of *H. dorsalis*.

HABITAT

The type locality is an aboriginal ceremonial wind-dreaming site 98 miles north-east of Mainoru in an area where the annual rainfall is approximately 50-60 inches. The pool is located on a sandstone plateau on which there are occasional outcrops of exposed quartzite. The vegetation surrounding the pool consists predominantly of sparse eucalypts and clumps of coarse grasses near the water, with occasional *Pandanus* and paper bark trees on the periphery. The bed of the pool is completely free of silt and the water is described as crystal clear and extremely soft.

Messrs. J. Coventry and C. Tanner, who obtained the series at Jasper's Gorge, noted that there the species was living in red silt in rock pools.

FIELD NOTES

The type series was collected at night at the edge of the water. The collectors noted that whereas other species occurring at the same site (*Hyla latopalmata* and *H. wotjulumensis*) jumped into the water when disturbed, the *H. meiriana* moved away from the water on to the dry slopes where they sought refuge amongst the vegetation.

DISTRIBUTION

Hyla meiriana is currently known from five localities in the Northern Territory and Western Australia. The nature of the terrain is such that this species probably occurs in numerous disjunct populations completely isolated from one another.

NORTHERN TERRITORY RECORDS OF *HYLA AUREA* AND
H. ADELAIDENSIS

Moore (1961) reported the presence in the British Museum collection of seven specimens of *H. aurea raniformis* from Port Essington that had previously been examined by Gunther (1858), Boulenger (1882) and Parker (1938). Moore (1961, p. 319) stated, "I would not believe the locality to be correct, were it not for the fact that Copland (1957) has seen specimens from Darwin, and Loveridge (1949) had specimens from Knuckey's Lagoon, which is 9 miles from Darwin".

The Darwin specimens which Copland (1957, p. 58) includes in his list of the *H. aurea raniformis* which he examined are N.M.V. D5529-30. The former bears a tag labelled "*Phactops* sp.," but lacks an identification in the museum register. The latter is labelled, "*Hyla* sp. young," and is registered as, "*Hyla* sp.". For reasons which are not apparent both were despatched to Copland in 1956 as examples of *Hyla aurea*. D5529 is a representative of *Limnodynastes ornatus*, and D5530 a *Crinia* sp. As there are no other frogs in the N.M.V. collection from the vicinity of Darwin labelled *aurea*, the inclusion of these registration numbers in Copland's list can be attributed to a clerical error, and this particular record discounted,

Loveridge (1949) provided a brief description of the specimens from Knuckey's Lagoon (M.C.Z. 25994-5) commenting that they were too shrivelled to merit measuring. Examination has shown them to be examples of *Cyclorana dahl*.

The presence of *Hyla aurea* in the Northern Territory therefore rests solely on the British Museum series (B.M. 1936. 12.13.135-141). This is not the only species whose presence in the Northern Territory has been queried (Glauert, 1947), and it is pertinent to note that all of the specimens involved were reported to have come from the same locality (Port Essington) and the same source (Dr. Fleming). In view of the identity of the specimens on which the subsequent reports were based it would seem justifiable to now remove *H. aurea* from the Northern Territory checklist.

With the exception of the reports of *aurea* from the Northern Territory considered above, the only additional record for any of the species first cited by Gunther (1858) is probably that of *Hyla adelaidensis* reported by Mitchell (1955, 1964). The specimens involved have been examined and are considered to represent the new species *Hyla meiriana*.

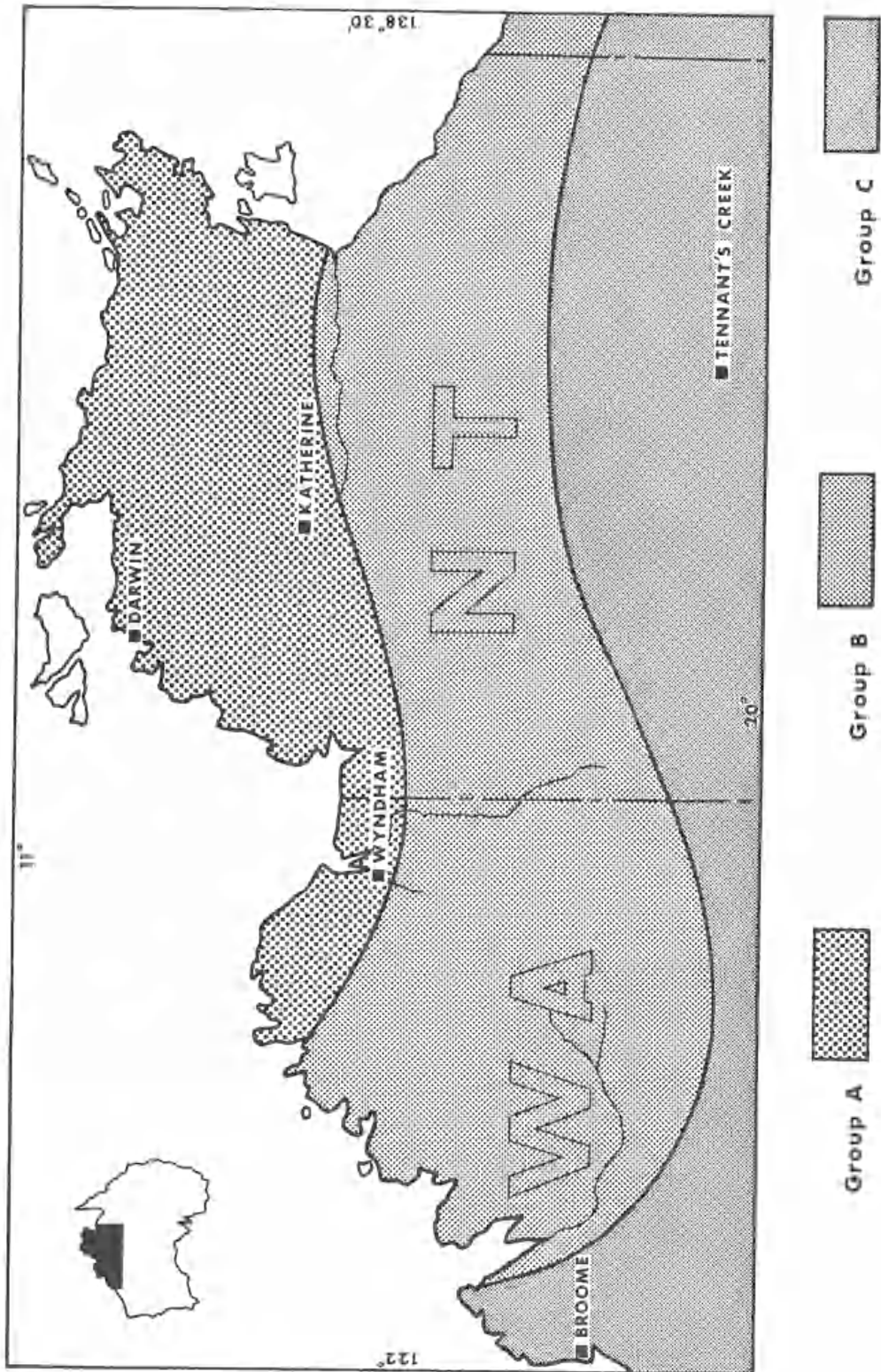


FIG. 3. Distribution patterns of north-western *Hyla*.

REVISED HYLID CHECKLIST

(All species occur in northern Western Australia and the Northern Territory)

<i>Hyla bicolor</i> (Gray).	<i>Hyla nasuta</i> (Gray).
<i>Hyla caerulea</i> (White).	<i>Hyla peroni</i> (Tschudi).
<i>Hyla coplandi</i> Tyler.	<i>Hyla rubella</i> Gray.
<i>Hyla latopalmata</i> (Gunther).	<i>Hyla wotjulumensis</i> Copland
<i>Hyla meiriana</i> new species.	

PATTERNS OF DISTRIBUTION

The hylid frogs occurring in north-western Australia can be divided into three groups according to their respective patterns of distribution. The groups and their member species are as follows:

- GROUP A: Species which are confined to areas with an annual rainfall exceeding 30 inches (*H. bicolor*, *H. meiriana*, *H. nasuta*).
- GROUP B: Species which extend from the coast to approximately the level of the twenty-inch isohyett (*H. coplandi*, *H. latopalmata*, *H. peroni*, *H. wotjulumensis*).
- GROUP C: Species which are widely distributed throughout the entire area and extend into the arid parts of Central Australia with an annual rainfall of less than ten inches (*H. caerulea*, *H. rubella*).

The first two groups form quite distinctive units but the third consists of a pair of species which are so widely distributed and so morphologically variable that each may ultimately merit sub-division.

The paucity of specimens from north-western Australia permits only the broadest generalisations concerning distribution. At localities such as Wotjulum, north of Kings Sound in Western Australia where several fairly extensive collections have been made, eight of the nine species listed above have been found, and the general pattern appears to be one of a gradual reduction in the number of species away from the high rainfall coastal localities. Thus all species occur in the area to which GROUP A are confined, and members of GROUP C share the area occupied by GROUP B (Fig. 3). The rather ubiquitous distribution of the species in GROUP C affects the interpretation of these patterns. It is therefore relevant to briefly summarize the problems involved.

The status of the Central Australian population of *Hyla caerulea* has been the subject of controversy. Spencer (1896) considered it a distinct species which he described as *H. gilleni*. Copland (1957) relegated it as a sub-species of *caerulea*, and Moore (1961) failed to find grounds for even the recognition of sub-species. The most recent contributor (Mertens, 1964) has resurrected *caerulea gilleni*.

A comparable situation exists in the case of Leptodactylid with a similar distribution pattern (*Limnodynastes ornatus*). Parker (1940) described *L. spenceri* from Central Australia, distinguishing it from the coastal *ornatus* by its more extensive toe webbing. Moore (1961) suppressed *spenceri*, but subsequent contributors (with the exception of Warburg, 1967) have not adopted this proposal.

Another species which has a similar distribution is *H. rubella*. Specimens from low rainfall areas tend to be larger, have broader heads and more highly developed lateral digital fringes than those from peripheral high-rainfall areas. However, there has not been any proposal that they should merit taxonomic recognition at the specific or sub-specific level.

Examination of north-western specimens of *caerulea* and *rubella* indicate that if distinct central and peripheral populations are recognized, the southern boundary of the latter is similar to that of the species in GROUP B, but for the purpose of the present discussion no subspecies are recognized.

The hylid fauna of the north-western Australia has hitherto (by implication if not by specific statement) been regarded as simply an extension of the fauna of the north-east, with a gradual westward reduction in the number of species. Utilizing the basic zoogeographical patterns of distribution of frogs adopted by Moore (1961), the north-western *Hyla* would be divided into the Centralian species (corresponding to GROUP C), and those confined to the "north-east crescent" (all remaining species). Of those in the latter category, only *latopalmata* and *peroni* exhibit a continuous range across the north of the continent, and then southwards along the eastern seaboard. *Hyla bicolor* and *nasuta* range over the same area, but (as suggested by Moore, 1961) they are probably separated into two disjunct populations, having yet to be reported from the southern margin of the Gulf of Carpentaria. This area may not be a barrier to *wotjulumensis*, and it is possible that this species occurs in north-western Queensland.

There is now an indication that the north-west possesses a distinctive endemic element in its hylid frog fauna. Intensive collecting is needed to establish the geographical distribution of the endemic species more precisely, but at present potential support for the recognition of north-western Australia as a separate unit within the Torresian zone is indicated.

SUMMARY

Hyla meiriana new species is described and reported from five localities in the Northern Territory and Western Australia. Recent records of *H. adelaidensis* and *H. aurea* in the Northern Territory are demonstrated to be based on misidentified specimens. A checklist of north-western *Hyla* is presented and distribution patterns of the component species are discussed.

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